What is claimed is:

1. An optical switch based on a rotating vertical micro-mirror constructed on a surface of a substrate, comprising:

at least one input optical fiber arranged to direct at least one optical signal through a free-space along a first optical path parallel to the surface of the substrate;

a plurality of output optical fibers arranged to receive the optical signal traveling through the free-space, at least one of the output optical fibers comprising an optical path not co-linear with the first optical path; and

at least one substantially vertical, rotating micro-mirror assembly located in the free-space comprising a rotating micro-mirror with a vertical centerline and an axis of rotation both perpendicular to the surface, but not co-linear, the rotating micro-mirror being rotatable between at least one first position not in the first optical path and at least one second position in the first optical path to redirect the optical signal to one of the output optical fibers.

2. The optical switch of claim 1 comprising a plurality of input optical fibers.

3. The optical switch of claim 1 wherein the plurality of output optical fibers are generally arranged around the rotating micro-mirror assembly wherein the second position comprises a plurality of positions each adapted to direct the optical signal to one of the output optical fibers.

4. The optical switch of claim 1 wherein the plurality of output optical fibers are generally arranged perpendicular to the first optical path comprising a rotating micro-mirror assembly adjacent to the first optical

path, but opposite each of the output optical fibers to selectively redirect the optical signal to any of the output optical fibers.

5. The optical switch of claim 1 comprising:

a plurality of input optical fibers each arranged to direct an optical signal through the free-space; and

an array of rotating micro-mirror assemblies constructed on the substrate arranged to direct the discrete optical signals from any of the plurality of input optical fibers to any of the output optical fibers.

6. The optical switch of claim 5 comprising a secondary array of output optical fibers arranged to receive the optical signals from one or more of the input optical fibers when the rotating micro-mirrors are in the first position.

7. The optical switch of claim 6 wherein one of the optical fibers in the secondary array are co-linear with each of the input optical fibers.

8. The optical switch of claim 1 wherein the input optical fiber is arranged generally perpendicular to each of the output optical fibers.

9. The optical switch of claim 1 wherein the rotating micro-mirror rotates about 45 degrees between the first position and the second position.

10. The optical switch of claim 1 wherein the rotating micro-mirror rotates about 135 degrees between the first position and the second position.

11. The optical switch of claim 1 comprising a gap between the axis of rotation and the rotating micro-mirror.

12. The optical switch of claim 1 comprising a gap between the axis of rotation and the rotating micro-mirror through which the optical signal can pass without engaging the micro-mirror.

13. The optical switch of claim 1 comprising a gap between the axis of rotation and the rotating micro-mirror through which the optical signal can pass when the micro-mirror is in the first position.

14. The optical switch of claim 1 wherein the rotating micro-mirror assembly comprises a linkage mechanism mechanically coupled to a plurality of thermal actuators.

15. An optical communication system including at least one optical switch in accordance with claim 1.

16. An optical switch comprising:

a plurality of input optical fibers each arranged to direct optical signals through a free-space along a plurality of input optical paths parallel to the surface of the substrate;

a plurality of output optical fibers not co-linear with the input optical paths and arranged to receive one of the optical signals traveling through free-space; and

a plurality of substantially vertical, rotating micro-mirror assemblies constructed on a surface of a substrate each comprising a rotating micro-mirror with a vertical centerline and an axis of rotation both perpendicular to the surface, but not co-linear, the rotating micro-mirrors being rotatable between a first position not in the input optical paths and at

least a second position in one of the optical paths to redirect one of the optical signals to one of the output optical fibers.